HAND HELD FUEL CONTAINER

This Application is a continuation-in-part of copending U.S. Patent Application Serial No. 29/170,282, the disclosure of which is hereby incorporated by reference. 7/9/03

BACKGROUND OF THE INVENTION

1. **Field of the Invention:**

[0001] This invention relates to portable hand held fuel containers that include an opening for filling and pouring fuel from the container and a vent cap that is openable to allow air to enter the container and enhance pouring, and more particularly, to such a container wherein a pour tube is separate from a fill tube, the vent cap is connected to the fill tube and inhibits fluid flow therethrough in case of overturning of the container during pouring, and a vapor seal member is connected to the pour tube and adapted during dispensing to simultaneously seal about the fuel inlet to a receiving tank and axially compress to permit deep insertion of the discharge end of the pour tube into the receiving tank.

2. **Description of Related Art:**

[0002] Portable hand held fuel containers are known. Typically, the container provides a chamber into which gasoline or other suitable fluid (e.g., diesel fuel or mineral spirits) is placed and then either stored, until needed, and then transported and transferred to apparatus where needed.

[0003] Such containers typically include an elongated pour tube or spout for discharging fuel from the container and into a receiving tank, and a venting arrangement to promote fuel discharge from the container. The top wall of the container is provided with an opening, which opening forms both an inlet for receiving and refilling the container with fuel and an outlet for discharging fuel.

In practice, one end of the pour tube is connected to the opening and fuel is discharged from the other end.

[0004] Typically, the vent arrangement comprises a closure cap that is snap-fitted into another opening formed in the container wall. Removal of the closure cap enables air to flow into the interior of the container to enhance fluid flow through the pour tube.

[0005] In use, the elongated pour tube is inserted into the opening of a receiving tank or other apparatus into which the fuel is to be transferred. Because the pour tube has a fixed diameter and is clearance fit within an opening of different but smaller diameter, an annulus is formed around the interface between the pour tube and the receiving tank. This annulus permits vapor to escape into the atmosphere.

[0006] In recent times, particularly in smog-plagued communities like the state of California, laws have been passed to minimize emissions from portable gas cans as well as from the tank receiving the gas from the gas can. Indeed, the California Air Resources Board ("CARB") now regulates the type of gas can that may be sold in California.

[0007] Desirably, the gas can would be such as to both seal the container and the receiving tank from emissions as well as permit entry of the spout into the receiving tank while accomplishing the vapor emissions sealing function.

[0008] The provision of a venting arrangement in such containers is also known. In some cases, as noted hereinabove, a snap-open closure plug is spaced from the pour spout and snap-fitted into an opening provided in the wall of the

gasoline container. In other arrangements, an air vent is associated with the pour spout. Desirably, the air venting arrangement would inhibit the leakage (i.e., spillage) of gas therethrough should the container overturn.

[0009] It is thus an object of this invention to provide a hand held portable gasoline container that overcomes the disadvantages of the prior art.

[0010] A further object of this invention is the provision of a portable hand-held fuel container which advantageously permits the fluid pour spout to fit gasoline inlets of different diameters in such a way as to minimize vapors escaping while fuel is being dispensed, inhibit spillage and evaporation through venting holes, inhibit spillage as fuel is being dispensed, and inhibit evaporation and spillage during transportation and storage of the container.

SUMMARY OF THE INVENTION

[0011] The present invention is directed to a portable hand held fuel container, comprising

a pour tube having a lower end connected to the container and an outlet end for dispensing fuel from the container,

a fill tube having a lower end connected to the container and an inlet end for introducing fuel into the container, said fill tube being separate and apart from the pour tube,

a removable closure cap to close the inlet end to the fill tube,

a vent arrangement in the closure cap that permits and prevents exterior air to enter to fill tube to enhance pouring and inhibit fluid flow through the fill tube in case of overturning of the container, and

a vapor seal member connected to the outlet end portion of the pour tube, said seal member being adapted during pouring to simultaneously seal about the fuel inlet to a fuel receiving tank and axially compress rearwardly of the outlet end wherein to permit deep insertion of the outlet end of the pour tube into the receiving tank.

[0012] According to one aspect of this invention, the vapor seal member comprises a cylindrical sleeve, said sleeve having a rearward and forward end portion, respectively, fixed to and movably disposed at the dispensing end of the pour tube. Preferably, the cylindrical sleeve is comprised of a continuous succession of longitudinally spaced undulations to enable axial compression of the sleeve. Further, the forward end portion of the sleeve forms a frusto-conical end face, the end face being adapted to force the sleeve axially rearwardly upon engagement with the fuel tank.

[0013] According to another aspect of this invention, the closure cap is juxtaposable, at least in part, and removable mountable in closed sealed relation, against the inlet end of the fill tube, and includes the vent arrangement. Further, the vent arrangement comprises said closure cap including an air passage that extends between the outside and interior surfaces of the cap, and an elongated valve stem to open and close the air passage, the stem being movable relative to the closure cap.

[0014] In a particular embodiment of the vent arrangement, the valve stem includes an upper end portion positionable above the upper (and outside) surface of the cap and a lower end portion that is positionable within a chamber formed within the cap. The air passage is comprised of the central chamber, a first

passageway extending through the stem for communicating air into the chamber, and a second passageway extending through the lower surface of the cap and into the fill tube. The first passageway includes a radial passageway that is locatable upon movement of the valve stem to be either above the upper surface, wherein to permit air to enter into the chamber, or below the upper surface and into closed relation, wherein to prevent air from entering the chamber. In the above noted permitting and preventing positions of the radial passageway, fuel is either inhibited or prevented from leaving the container.

[0015] Desirably, the valve stem is threadably engaged with the closure cap, to enable incremental adjustment thereof between open and closed positions, and a valve head to facilitate such positioning. Such positioning capability enables the user to increase the amount of external vent air that is passed from the outside of the gas can, wherein to enhance a smooth pouring action.

[0016] Further, elastomeric seal members are provided to seal the interfaces between (1) the valve head and the upper surface of the closure cap, and thus about the radial passageway when the head is in the closed position, and (2) the lower surface of the cap and the inlet end face of the fill tube, when the cap is closingly secured to the fill tube.

[0017] Desirably, the container is provided with a handle, which includes lower and upper handle portions to enable the user to grip the container and position the pour tube during dispensing of fuel from the container. In this regard, the lower handle portion is connected to the sidewall and to the lower

end portion of the fill tube, and the upper handle portion comprises, at least in part, the upwardly projecting end portion of the fill tube.

[0018] The foregoing summary, as well as the following detailed description of preferred embodiments, will be better understood when read in conjunction with the accompanying drawings, wherein like numerals refer to like parts throughout. For illustrating the invention, there is shown in the drawings a preferred embodiment, it being understood, however, that the invention is not limited to the specific methods and instrumentalities disclosed. In the drawings:

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. 1 is a perspective view illustrating a portable, hand held fuel container embodying the invention.

[0020] FIG. 2 is an enlarged view of the forward end portion of a pour spout of the fuel container shown in FIG. 1 and a collapsible bellows thereof when axially extended, the forward end face of the bellows forming a closure about the inlet to the receiving tank during insertion of the pour spout thereinto.

[0021] FIG. 3 illustrates, in partial section, the pour spout shown in FIG. 2.

[0022] FIG. 4 is an enlarged view of the forward end portion of the pour spout wherein the bellows has been axially compressed to expose and permit a greater length of the pour spout to be inserted into the receiving tank.

[0023] FIG. 5 is an exploded assembly view, in section, of a closure cap having a vent arrangement, according to the invention, positioned for closing connection with the inlet end of a fill tube.

[0024] FIG. 6 is a section view of the closure cap and venting arrangement, according to this invention, in a closed position.

[0025] FIG. 7 is an enlarged elevational view of a prior art flexible pour spout.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0026] As shown in the drawings for the purposes of illustration, the invention is embodied in a portable, hand held, fuel container, generally indicated at 10. Depending on the fluid stored and/or carried, the container is sometimes referred to as a "gas can".

[0027] The fuel container 10 comprises a generally cylindrical sidewall 12, a generally flat bottom wall 14, and a generally frusto-conically shaped upper endwall 16, the walls 12, 14 and 16 being generally symmetrically centered on a common geometrical axis "A" that extends through the center of the container. Preferably, the container 10 is integrally formed from a suitable polymer and the walls thereof define an interior fluid chamber for storing or transporting fuel.

[0028] The container 10 is formed to include a pour tube or spout 18 and a fill tube 20, each tube communicating with the interior fluid chamber of the container. According to an important aspect of this invention, the pour tube 18 is separate and apart from the fill tube 20.

[0029] The pour spout 18 is hollow, generally cylindrical, and is adapted to direct, dispense or otherwise discharge fluid from the container at an acute angle to the central axis of the container. The pour spout 18 is comprised of a rearward tube portion 22 and a forward tube portion 24, the rearward tube

portion 22 being at an acute angle Θ to the forward tube portion 24. The rearward tube portion 22 is axially aligned with the center axis of the container 10 and the geometrical center of the frusto-conical endwall 16. That is, the rearward end of the tube portion 22 is formed as a continuation of the endwall 16.

[0030] The tube portion 24 includes a forward end portion 26 and a forward end that defines a discharge opening 28 for dispensing or pouring fluid from the container.

[0031] Preferably, as is known in the art, the forward end portion 26 of the pour spout 18 is provided with thread 30 wherein to enable a spill or closure cap 32 to be removably secured thereto. The spill cap 32 operates to seal the discharge opening, wherein to inhibit gases to escape or fluid to spill from the container.

[0032] Preferably, and according to this invention, the forward end portion 26 is smaller in diameter than that of the tube portion 24, and a transition portion 34 joins the portion 24 and 26. As shown best in FIG. 3, the transition portion 34 is frusto-conical in shape and forms a wall or stop, in a manner to be discussed herein below.

[0033] Further, and according to an important aspect of this invention, an elongated, axially compressible, cylindrical sealing sleeve 36 is circumposed, in part, about the forward tube portion 24 and forward end portion 26 of the pour spout 18. As shown best in FIG. 3, the sealing sleeve 36 has a rearward end 38 and a forward end 40. The rearward end 38 is fixedly connected in 360° sealed

relation to the outer periphery of the tube portion 24. The forward end 40 is circumposed about the forward end portion 26 and is located between the discharge opening 28 and the stop 34.

[0034] Preferably, the sealing sleeve 36 comprises a continuous succession of longitudinally spaced undulations or cylindrical ribs and characterized by a series of peaks and valleys 42 and 44. The cross-section of the sealing sleeve 36 forms a corrugated or bellows-like member. The forward end 40 of the sleeve 36 is generally frusto-conical and centrally apertured at 46, the aperture 46 forming a clearance fitment about the outer periphery of the forward end portion 26.

[0035] Importantly, the sealing sleeve 36 is comprised of a resilient polymer. Further, the undulated nature of the sleeve 36 enables the sealing sleeve 36 to act as a spring member, enabling the sleeve to axially compress and return to its original shape.

[0036] In operation, the forward end portion 26 of the forward tube portion 24 is inserted into the inlet opening of a receiving tank (not shown). Progressive insertion of the end portion 26 positions the discharge end 28 into the receiving tank and brings the forward end 40 of the sealing sleeve 36 into sealing engagement with and about the inlet opening. Vapors from fuel thus dispensed into the tank are inhibited from escaping from the dispensing end 28 and into the atmosphere.

[0037] Simultaneously and with further inward insertion, the sleeve member 36 axially compresses, exposing more of the forward end portion 26 encircled by the sleeve member 36. As a result, the forward end portion 26 and

the discharge end 28 may be inserted even deeper into the receiving tank. Depending on the sealing sleeve 36 and its location relative to the pour tube 18, the frusto-conical wall 34 will form a stop to limit rearward compression of the sealing sleeve 36 as well as insertion of the forward end portion into the receiving tank.

[0038] FIG. 4 illustrates a condition of the sealing sleeve 36 following maximum insertion of the pour spout 18 into the receiving tank (not shown). The sealing sleeve 36 has undergone full axial compression and the maximum length of the forward end portion 26 has been exposed, resulting in the discharge end 28 being inserted as far as possible into the receiving tank.

[0039] Upon withdrawal, the sealing sleeve 36 expands to its original axial length, as shown in FIGS. 1 – 3.

[0040] The fill tube 20 is hollow, generally cylindrical, and is adapted to receive and introduce fluid into the container. The fill tube 20 is comprised of a rearward tube portion 46 and a forward tube portion 48, the rearward tube portion 46 being at an acute angle Φ to the forward tube portion 48 and formed with the sidewall 12. The forward end portion 48 is disposed on an axis "B" that is in parallel relation to the center axis "A" of the container 10 and has an end face 50 disposed in a plane generally perpendicular to the axis "A". The end face 50 defines an inlet 52 that is used to introduce fluid into the fill tube 20, therein to fill and/or refill the container with fluid. The inlet 52 and the narrowed portion between the endwall 16 and the pour tube 18 are generally in the same plane.

[0041] To prevent spillage from the container 10, a closure cap 54 is threadably secured to thread 56 formed about the forward end portion 48, the thread 56 being proximate to the inlet 50.

[0042] Further, to promote a reasonably smooth flow of fluid from the interior storage chamber of the container 10 and into the pour spout 18, the closure cap 54 is provided with an air vent arrangement.

[0043] Preferably and referring to FIG. 5, the closure cap 54 according to this invention is generally cylindrical and includes a circular top wall 58, and a cylindrical side wall 60, the sidewall encircling the top wall 58 and having thread 62 formed on the interior wall thereof to engage with the thread 56 on the fill tube 20. A cylindrical boss 64 is formed centrally of the top wall, the boss projecting upwardly therefrom to an end face 66. A cylindrical housing 68 is formed centrally of the top wall 58, the housing projecting downwardly therefrom to an end face 70 and dimensioned to clearance fit within the inlet 52. An annular space 71 is formed between the side wall 60 and the outer periphery of the housing 68.

[0044] An air path extends between the end faces 66 and 70. In this regard, an interior chamber 72 is formed in the housing 68, a bore 74 extends through the boss 64 and between the end face 66 thereof and into the chamber 72, and a passage 76 extends between the end face 76 of the housing 68 to the chamber 72 therewithin.

[0045] Further, a threaded fastener 78 having a head 80 and an elongated stem or body 82 having exterior thread 84 is provided to threadably interengage

with thread 86 formed on the interior wall of the bore 74, whereby the fastener 78 may incrementally advance towards or away from the end face 66 of the boss 58.

[0046] According to this invention, the fastener 78 is uniquely designed to provide the threaded stem 82 with a central bore 88 and a radial passage 90 adjacent to the head 80. The central bore 88 extends generally coaxially through the interior of the stem 82 from the forward end 92 thereof to the head 80. The radial passage 90 extends transversely across the stem 82, intersecting the central bore 88 and opening on the exterior threaded surface of the stem 82.

[0047] To assist in maintaining a fluid tight seal, the closure cap 54 is provided with a pair of seal members 94 and 96. The seal member 94 is seated against a boss or land 98 within the annulus 71 formed about the housing 68 and adapted to be compressed into sealed relation by the end face 50 of the fill tube 20 when the closure cap 54 is tightly secured thereto.

[0048] The seal member 96 is adapted to be compressed between the end face 66 of the boss 64 and head 80 of the threaded fastener 78the end face of the fill tube. The seal member 78 is proximate to the radial passages 74 and ensures that when head 80 of the fastener 78 is moved downwardly and pressed against the seal member 96, the radial passages 74 is disposed within the bore 88 and no air or fluid may escape from the container 10.

[0049] Contrariwise, when the head 80 of the fastener 78 is retracted from the end face 66, the radial air passage 90 is positioned to allow air to enter the central passage 88, but is small enough to inhibit fluid exiting therethrough.

[0050] FIG. 6 illustrates the closure cap 54 when connected to the end of the fill tube 20 and in sealed non-venting relation therewith. In this situation, the threaded fastener 78 has been advanced into the closure cap 54 such the radial passage 90 is disposed within and closed by the bore 88. In this position, the passage of venting air to the interior chamber of the container 10 from outside the container via the radial passage 74, the central passage 88, the chamber 72, and the passage 76 is prevented. Spillage and vapor emissions are prevented.

[0051] In use, the threaded fastener 78 would be rotated in such manner that the threaded stem 82 and radial passage 90 would be moved upward and away from the seal member 96 mounted atop the end face 66 of the boss 64. Sufficient upward rotation of the threaded fastener 78 results in the radial passage 90 being brought into communication with outside air, thus enabling air to pass through the radial passage 90, the central bore 88, the chamber 72, the passage 76 in the bottom of the housing 68, and into the interior storage chamber of the container 10.

[0052] To promote sealing, the forward end face 92 of the threaded fastener 78 is frusto-conical in shape and the interior surface of the bottom wall of the housing 68 is provided with a matching frusto-conical recess (not shown). The length of the stem 82 of the fastener 78 is dimensioned such that the shaped end face sealingly seats within the recess when the radial passage 90 is blocked by the interior wall of the central bore 86.

[0053] Preferably, the fuel container 10 is integrally molded of a suitable material that is impervious to chemical attack, impact resistant, and non-corroding. A suitable material is a heavy gauge, lightweight, formulated high-density plastic, such as polyethylene.

[0054] Further, the container 10 is provided with a handle 100 to facilitate positioning of the pour and fill tubes 18 and 20. In a preferred embodiment, the handle 100 is integral with the sidewall and includes, at least in part, the upward end portion of the fill tube 20, and a lower handle portion 102.

[0055] In such handle 100, the user may advantageously grip the lower portion 102 of the handle with one hand and an upper portion of the fill tube with the other hand, which portion is above the upper end wall of the container. The handle 100 provides the user with a two point gripping relation with the container 10, enabling the pour tube 18 to be positioned more easily when the container is full or extremely large, and thus awkward and heavy.

[0056] In the fuel container 10 illustrated herein above, the vapor sealing arrangement is fixedly attached to the forward end portion of the pour tube 18. As contemplated herein, the vapor sealing arrangement is intended to be removably attached to the gas can 10 as a subassembly.

[0057] According to this aspect of the invention, the vapor sealing subassembly (not shown) is removably attached to thread provided at the end of the tube 24. The vapor sealing assembly comprises a section of tubing, the axially compressible sealing sleeve 36, and a coupling nut.. The coupling nut is

positioned at the rearward end portion of the section of tubing for connection with tread formed externally about the forward end of the tube 24.

[0058] The section of tubing has a rearward end, the intermediate wall 34, and the forward end portion 26. The rearward end 38 of the sealing sleeve 36 is fixedly connected to the rearward end portion of the tubing section (in a manner described hereinabove with reference to the tube 24.

[0059] Desirably, such removablity enables different pour spouts and vapor seal assemblies to be used in connection with the fuel container 10. For example, such connectability enables the use of the pouring spout 136 as disclosed in United States Patent No. 4,921,147, issued May 1, 1990 to Poirier, the disclosure of which is incorporated herein by reference.

[0060] Briefly, as shown in FIG. 7, the pouring spout 136 of May comprises a single accordion-like tubular section 142 that is formed by a series of ribs 138 that extend between two sleeve sections 144 and 146, and an annular outturned flange 148 on the sleeve 144. In operative position, the spout 136 extends into the fuel receiving tank with the inside face of the flange 148 seated against the outlet of the fuel container. Each rib 138 is circular and formed by frusto-conical walls 152 and 154 that enable the pouring spout 138 to both flex and telescope inwardly and/or outwardly. When the spout is retracted and/or extended and/or bent into a desired shape, the spout retains the shape into which bent. A coupling nut is positioned at the flange 148 to secure the spout 138 to the fuel container.

[0061] Additionally, such removability enables the attachment of Wedco spill-proof nozzle, Model No. 40730, such as used in Wedco fuel container models WCA-125, WCA-225, and WCA-525, which nozzle is believed responsive to current California Air Resource Board regulations relating to gas cans. This spill-proof nozzle is used in conjunction with a "no vent" can, prevents the escape of fuel and/or vapors, and shuts off automatically when the receiving tank is full. Similar to the pouring spout 136 described herein above, a coupling nut is used to removably connect the spill-proof nozzle to the pour spout of the fuel container 10. When used in states such as California, the spill-proof nozzle may be used with the fuel container 10 herein above described by replacing the "venting" closure cap 78, removably connected to the inlet of the fill tube 20 of the fuel container 10, with a "no-vent" cap.

[0062] While the present invention has been described with respect to specific embodiments, it will be understood that from the foregoing detailed description and accompanying drawings that various modifications and variations will occur to those skilled in the art. Such modifications and variations are intended to fall within the scope of the appended claims.